The history of the electric battery

This text is the work of my grandfather Michel SIMEON. This version is not complete. It still lacks some engravings.

If this text interested you and you wish to ask some questions, send a message to his address **michel.simeon@free.fr** by specifying HISTORY in the subject of the message.

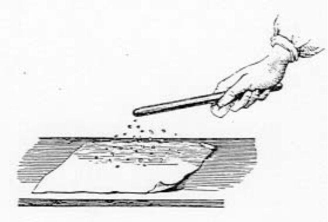
The Electric Battery

At the beginning of the year 1800, lived in CÔME a learned physicist, Count Alessandro VOLTA. He was fifty-five years old.

After having been a professor at the University of Pavia and made several discoveries concerning STATIC ELECTRICITY he had traveled to meet other scholars. He had traveled to SWITZERLAND, FRANCE, GERMANY, the NETHERLANDS, and ENGLAND.

He had just retired to his homeland to find peace and pursue experiments on Electricity.

At the time when VOLTA lived the knowledge of electricity was not yet very developed.

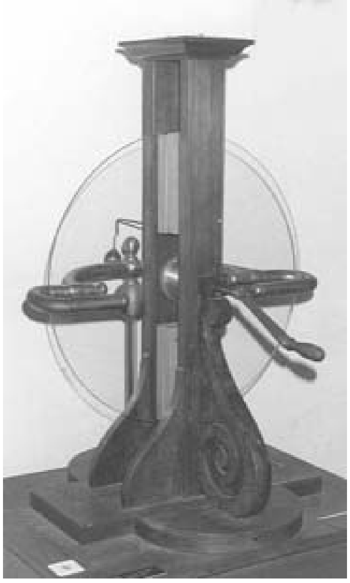


For two thousand years it was known to attract strands of straw or light tree leaves with pieces of YELLOW AMBER rubbed on a woolen cloth.

Yellow Amber is a beautiful, almost transparent stone with which the ancients made jewelry.

In GREEK, Amber Yellow is called "ELECTRON". This is the origin of the word ELECTRICITY.

To experiment, you can also use glass rods or sealing wax.



From 1600, new progress had been made and were sparked comparable, much smaller, to the lightning, turning the crank of one of these curious instruments called "MACHINE RAMSDEN".

Scholars sought to explain these phenomena and had made numerous and very interesting observations, but electricity did not give rise to any use in everyday life.

At that time, electric lamps did not exist. Houses and streets were lit with candles or oil lamps.

No electric motors to power the factories. No trains. Men had to provide a lot of muscular effort to work and move around.

They were also helped by horses, mules or oxen. They also used the force of the wind and the water of the rivers to turn the mills.

Steam engines had just been invented, but they were very rare.

No telephone, no radio or television. The news was conveyed by messengers, the diligences of the post office or by the TELEGRAPHE of Claude CHAPPE whose rotating wings were seen at the top of towers or hills.

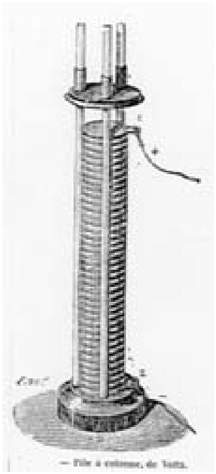
So in March of this year 1800, we find VOLTA in his physics cabinet. On a table are placed silver coins, ZINC, COPPER and thick cardboard rings. Three sticks of wood are erected between which the old scientist superimposes with the greatest care, always in the same order, a copper washer, a washer of zinc and then a washer of very wet cardboard.

He STRIPS over sixty. That's why he gave the name of PILE to this strange device he had imagined a few months before.

Touching with the fingers and at the same time the ends of the column, he felt through his body an unpleasant shock ... an electric shock!

Having fixed metal wires to the washers of the bottom and the top, he approached them at a very short distance. Immediately a small blue spark and very bright springs.

The battery therefore produced the same effects as the RAMSDEN machine, but the jolts and sparks could be renewed as many times as desired without the need to continuously turn the crank.



— Pile à colonne, de Volta.

But how could a man so serious as Alexandre VOLTA come to pile up copper washers on slices of Zinc?

It's a curious story ... a story of ... FROGS OF FROG!

It is necessary to go back fifteen years before, in 1786 and to BOLOGNE. A famous professor of anatomy at the city's university had the idea of experimenting with the effects of the electric spark produced by the RAMSDEN machine on corpses of animals.

He had observed that, under the influence of the discharge, the thighs of a frog cut in two were abruptly close together. The beast seemed to come back to life, as if to jump.

Another day, while dissecting again a frog he noticed a contraction of his thighs although no electric machine worked around.

It was enough for a metal rod to be in contact between one of the lumbar nerves (bottom of the spine) of the animal and the muscle of his thighs.

BOLOGNA - Great and beautiful city of Northern Italy (Between Venice and Florence.) Nearly 500,000 inhabitants. Its important university founded in 425 is the oldest in Europe. (Anatomy - Right)

The GALVANI experiment was renewed with even greater success using a kind of Compass, consisting of a copper bow and a Zinc bow.

GALVANI tried to explain the phenomenon and concluded that there is an animal electricity.

VOLTA, while in Como, heard of the experience. He took an interest in it, worked in his laboratory, but came to other conclusions.

For him, two different metals put in contact produced electricity. She was the cause of the frog's reactions.

It is to prove that he began to imagine devices composed of very different metal plates and eventually build the PILE that we have already seen.

VOLTA and GALVANI did not agree and they discussed with passion for several years.

Everyone had some truth, but both had not yet been able to understand everything.

We owe to their spirit of observation, their work, their patience, their intelligence the discovery of a marvelous instrument.

The PILE made giant steps to SCIENCE and Industry.

The COLUMN Stack had some disadvantages. Under the weight of the metal elements, wet cardboard slices were oozing and drying.

VOLTA himself was quick to perfect his invention.

He placed the ZINC and COPPER plates in small glass containers containing a mixture of water and SULFURIC ACID (3/100 acid).

A small metal band, connected the COPPER plate contained in a vase to the ZINC plate of the next vase and so on. Inside the vases, the plates should not touch each other and therefore always be separated by the acidulated liquid.

The vertical instrument thus took the horizontal position, but retained its name because its inventor called it BATTERY CROWN of CUPS.

In 1802 the Englishman CRUIKSHANK created the PILE in AUGES.

His compatriot WOLLASTON built at the same time the pile that bears his name.

In principle, by the elements used (COPPER, ZINC, ACIDULATED WATER) these batteries are similar to that of VOLTA. On the other hand, the larger surface of the plates and their arrangement allowed the pile to be much more effective.

English scientists built powerful stacks, performed many experiments, and began making discoveries.

One day in the year 1813, Emperor Napoleon I heard about the great works of the Englishman Humphrey DAVY.

With his usual impetuosity, the Emperor asked why these discoveries had not been made in France.

"Sire," replied the French scientist BERTHOLET, "it is because to this day we have not possessed a sufficiently powerful voltaic pile.

- Well ! that one immediately builds a sufficient one, and that one spares neither care nor expense.

Thus was built at the expense of the state, the magnificent voltaic pile of the polytechnic school.

This pile consisted of 600 pairs of copper and zinc of 9 square decimetres for each plate; the whole battery had 54 square meters of surface. "

With this huge and powerful battery, French physicists and chemists, GAY-LUSSAC, THENARD, AMPERE, ARAGO and many others were able to work and make great discoveries.

The batteries at AUGES and the WOLLASTON BATTERIES were used until 1836.

But these beautiful piles had a flaw! Their strength decreased with use.

The Scientists who used them after a while could no longer succeed in their experiments and had to stop work.

The battery was left at rest or cleaned to regain its qualities.

The researchers of the time discovered that this disadvantage was due to complex chemical phenomena which were given the name of POLARIZATION.

Mainly, the deposit of tiny bubbles of hydrogen on the COPPER slowed the passage of the CURRENT.

The Battery Builders, for years, tried without success to prevent the release of these bubbles.

1829 - A great French scientist: Antoine César BECQUEREL is concerned with this question of POLARIZATION. He invents a battery that avoids the parasitic phenomenon. This is the battery with TWO SEPARATE LIQUIDS.

BECQUEREL had the idea of enclosing the ZINC plate bathed in the acidulated water inside a small bag of BAUDRUCHE, that is to say a very thin film made with the large intestine of the ox , which we also made balloons. Everything is immersed in a rectangular COPPER vase filled with a saturated solution of COPPER SULPHATE.

The balloon prevents unfavorable mixing of the two liquids, but does not interfere with electrical phenomena.

This instrument is recognized as the first battery to CURRENT CONSTANT.

After BECQUEREL, many other inventors will create piles ever more powerful, more constant and less cumbersome. Let's review the main ones:

1836 - The English physicist, John Frederic DANIELL (1790-1845) member of the Royal Society, with the idea of replacing the balloon with a vase of POROUS PIPE ... because it was only cooked in part.

The pile of DANIEL which is very close to that of BECQUEREL had a great success. It was long used by those who were looking for a stable current.

1838 - William Robert GROVE (1811-1896), an English lawyer who occupied his spare time in research on electricity, replaces the copper blade with PLATINUM dipped in AZOTIC ACID.

The GROVE stack, much stronger than DANIELL's, was less common because platinum, a precious metal, is expensive.

1843 - Robert Wilhem BUNSEN (1811-1899), famous professor at the University of HEIDELBERG, in western Germany, replaces platinum with COAL OF CORNUE ... much less expensive. The retort charcoal is made with a fine powder of coal, highly compressed.

The device we see disassembled consists of:

I °) A sandstone or glass vessel filled with a solution F to I / 10 th of sulfuric acid.

2 °) A hollow cylinder of ZINC: Z

3 °) A porous vase: V filled with nitric acid.

4 °) A plate of retort carbon: C

In the vase F is placed the Zinc, then the porous vase and in the center the coal.

The BUNSEN stack was used extensively by those seeking power and rendering great service.

It has the disadvantage of releasing smelly and even harmful vapors.

1842 - Johan-Christian POGGENDORFF (1796-1877), a famous physicist from the University of Berlin, replaces the nitric acid of the Bunsen cell with a red-orange solution of POTASSE BICHROMATE.

This two-fluid battery had the advantage of not spreading acid vapors but its power was declining rather quickly.

1850 - The French worker GRENET has the idea of removing the porous earthen vessel. It mixes, water, sulfuric acid and dichromate of potash. The electrodes are composed of two blades of retort charcoal and a blade of Zinc AMALGAME (that is well cleaned Zinc, immersed for a few moments in mercury.)

This brought us back to a powerful single-fluid battery whose depolarization was perfect.

The only precaution to take was to remove the Zinc blade from the liquid when the device was not in use, to avoid corrosion.

Thus was born the BATTERY BOTTLE of which we still find many: copies. It was widely used by physics experimenters of the late nineteenth and early twentieth century.

Other solutions have been recommended to protect Zinc blades thinking rest periods.

With the pile of TROUVE, they were raised by means of a crank winch.

With the CHARDIN battery of Dr. BOISSEAU du ROCHER, the liquid was raised and lowered by air pressure in improved porcelain containers.

1868 - The Parisian engineer Georges LECLANCHE (1839-1882) creates a pile that will have a great future.

In a square-bottomed glass jar are:

- An amalgamated Zinc pencil

- A porous soil cylinder in which is placed a retort carbon plate and a solid depolarizer composed of two black powders of MANGANESE BIOXIDE and charcoal.

The whole is bathed in an ELECTROLYTE composed of water in which has been dissolved a white powder: AMMONIUM CHLORIDE.

The LECLANCEE battery is a little less powerful and less stable than the GRENET battery, but is ideal for intermittent, short-term and repeated uses.

It has great advantages: It requires little maintenance and handling. The products used are not dangerous and above all it is only used if it is used.

The batteries that are being bought nowadays (120 years later) in tobacco shops or supermarkets around the world are slightly modified LECLANCHE batteries, manufactured in very large quantities in factories.

The liquid is immobilized by a viscous substance (agar-agar) and tightly closed in the Zinc housing and a plastic wrap.

These so-called SECHES batteries are thus transportable without fear of breaking them or seeing the electrolyte flow.

And now, here is a curiosity that brings us back to the 1840s - 1850s.

The charming carousel depicted on the engraving was as much a toy as a scientific instrument.

The little characters drawn on a light cardboard, turned day and night for years without the help of a visible external force.

Some believed that the PERPETUAL MOVEMENT had been invented.

We can think that it is the first model of ELECTRIC MOTOR rotating ... but its strength was tiny. It could not be of much use.

The device was powered by a very special battery called ZAMBONI, named after the Italian inventor VERONA who built it for the first time in 1810.

Paper washers coated with TIN on one side and moist BIOXIDE on MANGANESE were used on the other. So we stacked MORE than 1800, which is pretty impressive.

To prevent the washers from drying out, the outside was coated with a layer of sulfur or shellac.

Everything was hidden in the base of the carousel.

The electricity obtained was very similar to that which we produce by turning the crank of one of these old machines "STATIC". But it was permanent, that is to say, it had the advantage of remaining active for years (as long as the paper pucks remained wet) without the need to turn a crank.

The ends of the stack were connected to balls + and - placed at the top of columns a and b.

The small "standards" of very light metal hooked and isolated at the end of the supports supporting the pods, were strongly attracted by balls + and - charged with electricity. As soon as they came in contact with the balls, they were pushed back and the carousel began to spin. Then the following standards were themselves attracted and repulsed ... and so on.

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